

CLAIMS

What is claimed is:

1. A light emitting diode (LED) light source drive, comprising:

an LED voltage supply adapted to receive an input voltage signal from a voltage source and to generate an output voltage signal that can be applied to an LED light source having an effective operating lifetime; and

an LED voltage controller connected to the LED voltage supply and adapted to control the output voltage signal so that light output by the LED light source when it is connected to the LED voltage supply remains approximately constant over the effective operating lifetime of the LED light source.
2. The drive of claim 1, wherein the LED voltage controller is adapted to operate using an open loop control scheme.
3. The drive of claim 1, wherein the LED voltage controller is adapted to increase the output voltage signal by predetermined amounts at predetermined times during the effective operating lifetime of the LED light source.
4. The drive of claim 1, wherein the LED voltage controller is adapted to control the output voltage signal based on the degradation rate and timing of the LED light source.

5. The drive of claim 1, wherein the LED voltage controller is adapted to operate using a closed loop control scheme.

6. The drive of claim 1, further comprising an LED light sensor adapted to generate a light signal indicative of the effective light output of the LED light source, and wherein the LED voltage controller is adapted to control the output voltage signal based on the light signal generated by the LED light sensor.

7. A current supply for a light emitting diode (LED) light source, comprising:

an LED current generating circuit adapted to receive current from a power source and to generate a current signal that can be supplied to an LED light source having an effective light output; and

an LED current controller connected to the LED current generating circuit and adapted to control the current signal output by the LED current generating circuit so that the current signal compensates for reductions in the effective light output of the LED light source.

8. The current supply of claim 7, wherein the LED current controller is adapted to control the current signal output by the LED current generating circuit based on a reduction in the effective light output of the LED light source.

9. The current supply of claim 7, wherein the LED current controller is adapted to continually increase the current signal output by the LED current generating circuit over the effective operating lifetime of the LED light source.

10. The current supply of claim 7, wherein the LED current controller is adapted to increase the current signal output by the LED current generating circuit at a constant rate over the effective operating lifetime of the LED light source.

11. The current supply of claim 7, wherein the LED current controller is adapted to increase the current signal output by the LED current generating circuit at a variable rate over the effective operating lifetime of the LED light source.

12. The current supply of claim 7, wherein the LED light source has a predetermined degradation profile and the LED current controller is adapted to control the current signal output by the LED current generating circuit based on the predetermined degradation profile.

13. A power supply for a light emitting diode (LED) light source, comprising:

an LED power converter adapted to receive power from a power source and to generate an output power signal that can be applied to an LED light source having an effective operating lifetime and an effective light output; and

an LED power controller connected to the LED power converter and adapted to control the output power signal so that it compensates for degradations in the effective light output of the LED light source and ensures that light output by the LED light source when it is connected to the LED power converter remains relatively constant over the effective operating lifetime of the LED light source.

14. The power supply of claim 13, wherein the LED power converter is adapted to:

- receive a low frequency ac power signal;
- convert the low frequency ac power signal into a dc power signal;
- convert the dc power signal into a high frequency ac power signal; and
- convert the high frequency ac power signal into the output power signal.

15. The power supply of claim 13, wherein the LED power converter is adapted to:

- receive a dc power signal;
- convert the dc power signal into a high frequency ac power signal; and
- convert the high frequency ac power signal into the output power signal.

16. The power supply of claim 13, wherein the LED power controller is adapted to increase the output power signal by:

- measuring an amount of time that the LED drive is connected to the LED light source;

comparing the measured time to a reference time; and

when the measured time exceeds the reference time, increasing the output power signal a predetermined percentage.

17. The power supply of claim 16, wherein the LED power controller is adapted to measure the amount of time that the LED drive is connected to the LED light source by:

sensing when the LED light source is connected to the LED drive; and

activating a timing module when the controller senses that the LED light source has been connected to the LED drive.

18. The power supply of claim 17, wherein the LED power controller is adapted to reset the timing module when the LED light source is replaced while the power source is supplying power to the LED drive.

19. A light emitting diode (LED) light source control system, comprising:

an LED current converter adapted to receive current from a current source and to generate a current signal that can be supplied to an LED light source having an effective operating lifetime and an effective light output;

an LED light sensor adapted to receive light output by the LED light source and to generate a light signal based on the light output; and

an LED controller connected to the LED current converter and the LED light sensor, the LED controller adapted to adjust the current signal output by the LED power converter based on the light signal so that the current signal compensates for degradations in the effective light output of the LED light source and maintains the light output by the LED light source at a relatively constant level over the effective operating lifetime of the LED light source.

20. The control system of claim 19, wherein:

the LED current converter is adapted to generate a high frequency ac power signal and to convert the high frequency ac power signal into the current signal;
and

the LED controller is adapted to increase the current signal by increasing the frequency of the high frequency ac power signal.

21. The control system of claim 19, wherein the LED controller is adapted to stop increasing the current signal output by the LED current converter when the effective operating lifetime of the LED light source is exceeded.

22. The control system of claim 19, wherein the LED controller is adapted to stop supplying the current signal to the LED light source when the effective operating lifetime of the LED light source is exceeded.

23. The control system of claim 19, wherein

the LED current converter has a nominal output current signal; and

the LED controller is adapted to increase the current signal output to the LED light source a predetermined percentage of the nominal output current signal after LED light source has been operated for a predetermined number of hours.

24. The control system of claim 19, wherein the LED controller is adapted to cause the LED current converter to stop outputting the current signal when the LED light source is disconnected from the LED drive.

25. The control system of claim 19, wherein the LED controller is adapted to cause the LED current converter to:

stop outputting the current signal when the LED light source is disconnected from the LED drive; and

to automatically restart outputting the current signal when the LED light source is reconnected to the LED drive.

26. A drive for an LED light source, comprising:

an LED current generator, the LED current generator including an ac/dc converter, an inverter connected to the ac/dc converter, and a rectifier connected to the inverter; and

an LED current controller connected to the LED current generator, the LED current controller including an LED connection sensing module, a timing module, a memory module, and a control module.

27. The drive of claim 26, wherein the ac/dc converter includes a bridge rectifier connected to a converter output capacitor.

28. The drive of claim 26, wherein the inverter includes:

a half-bridge circuit; and

a series resonant output circuit connected to the half-bridge circuit.

29. The drive of claim 26, wherein the rectifier includes a diode.

30. The drive of claim 26, wherein the rectifier includes a bridge rectifier and a rectifier output capacitor.

31. The drive of claim 26, wherein the LED current controller is implemented using a microcontroller.